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UTILITY PATENT APPLICATION TRANSMITTAL

(Only for new nonprovisional applications under 37 CFR 1 53(b))

Attorney Docket No.	042390.P9139
First Inventor or Application Identifier	Lawrence A. Booth, Jr.
Title	DISPLAY SCREEN
Express Mail Label No.	EL034434638US

APPLICATION ELEMENTS
See MPEP chapter 600 concerning utility patent application contents

ADDRESS TO: Assistant Commissioner for Patents
Box Patent Application
Washington, DC 20231

1. ☒ Fee Transmittal Form
(Submit an original, and a duplicate for fee processing)
2. ☒ Specification [Total Pages 18]
(preferred arrangement set forth below)
   - Descriptive title of the Invention
   - Cross References to Related Applications
   - Statement Regarding Fed sponsored R & D
   - Reference to Microfiche Appendix
   - Background of the Invention
   - Brief Summary of the Invention
   - Brief Description of the Drawings (*if filed*)
   - Detailed Description
   - Claim(s)
   - Abstract of the Disclosure
3. ☒ Drawing(s) *(35 U.S.C. 113)* [Total Sheets 4]
4. Oath or Declaration [Total Pages 5]
   a. ☐ Newly executed (original copy)
   b. ☐ Copy from a prior application (37 C.F.R. § 1.63(d)) *(for continuation/divisional with Box 16 completed)*
      i. ☐ DELETION OF INVENTOR(S)
      Signed statement attached deleting inventor(s) named in the prior application, see 37 CFR §§ 1.63(d)(2) and 1.33(b).

*NOTE FOR ITEMS 1 & 13: IN ORDER TO BE ENTITLED TO PAY SMALL ENTITY FEES, A SMALL ENTITY STATEMENT IS REQUIRED (37 C.F.R. § 1.27), EXCEPT IF ONE FILED IN A PRIOR APPLICATION IS RELIED UPON (37 C.F.R. § 1.28).

5. ☐ Microfiche Computer Program *(Appendix)*
6. Nucleotide and/or Amino Acid Sequence Submission
(if applicable, all necessary)
   a. ☐ Computer Readable Copy
   b. ☐ Paper Copy (identical to computer copy)
   c. ☐ Statement verifying identity of above copies

ACCOMPANYING APPLICATION PARTS

7. ☐ Assignment Papers (cover sheet & document(s))
8. ☐ 37 C.F.R. § 3.73(b) Statement *(when there is an assignee)* ☐ Power of Attorney
9. ☐ English Translation Document *(if applicable)*
10. ☐ Information Disclosure Statement (IDS)/PTO - 1449 ☐ Copies of IDS Citations
11. ☐ Preliminary Amendment
12. ☒ Return Receipt Postcard (MPEP 503)
(Should be specifically itemized)
13. ☐ *Small Entity Statement(s) ☐ Statement filed in prior application, Status still proper and desired
14. ☐ Certified Copy of Priority Document(s)
(if foreign priority is claimed)
15. ☐ Other: ....

16. **If a CONTINUING APPLICATION,** *check appropriate box, and supply the requisite information below and in a preliminary amendment:*
☐ Continuation ☐ Divisional ☐ Continuation-in-part (CIP) of prior application No: ________
Prior application Information: Examiner ________ *Group/Art Unit:* ________
For CONTINUATION or DIVISIONAL APPS only: The entire disclosure of the prior application, from which an oath or declaration is supplied under Box 4b, is considered a part of the disclosure of the accompanying continuation or divisional application and is hereby incorporated by reference The incorporation can only be relied upon when a portion has been inadvertently omitted from the submitted application parts.

17. CORRESPONDENCE ADDRESS

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Name	BLAKELY, SOKOLOFF, TAYLOR & ZAFMAN LLP				
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City	Los Angeles	State	California	Zip Code	90025
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Name (Print/Type)	Gregory D. Caldwell, Reg. No. 39,926		
Signature		Date	09/15/00

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FEE TRANSMITTAL for FY 1999

Patent fees are subject to annual revision.
Small Entity payments must be supported by a small entity statement, otherwise large entity fees must be paid. See Forms PTO/SB/09-12. See 37 C.F.R §§ 1.27 and 1.28.

TOTAL AMOUNT OF PAYMENT ($) 936.00

Complete if Known	
Application Number	
Filing Date	September 15, 2000
First Named Inventor	Lawrence A. Booth, Jr.
Examiner Name	
Group/Art Unit	
Attorney Docket No.	042390.P9139

METHOD OF PAYMENT (check one)

1. ☐ The Commissioner is hereby authorized to charge indicated fees:
2. ☒ The Commissioner is hereby authorized to credit any over payments to:

Deposit Account Number: 02-2666

Deposit Account Name: Blakely, Sokoloff, Taylor & Zafman LLP

☒ Charge Any Additional Fees Required Under 37 CFR §§ 1 16,1.17, 1.18 and 1.20.

2. ☒ Payment Enclosed:
☒ Check ☐ Money Order ☐ Other

FEE CALCULATION

1. BASIC FILING FEE

Large Entity Fee Code	Large Entity Fee ($)	Small Entity Fee Code	Small Entity Fee ($)	Fee Description	Fee Paid
101	690	201	345	Utility filing fee	$690.00
106	310	206	155	Design filing fee	
107	480	207	240	Plant filing fee	
108	690	208	345	Reissue filing fee	
114	150	214	75	Provisional filing fee	

SUBTOTAL (1) ($) 690.00

2. EXTRA CLAIM FEES

				Extra Claims		Fee from below		Fee Paid
Total Claims	25	- 20 =		5	X	18.00	=	$90.00
Independent Claims	5	- 3 =		2	X	78.00	=	$156.00
Multiple Dependent							=	

***or number previously paid, if greater, For Reissues, see below*

Large Entity Fee Code	Large Entity Fee ($)	Small Entity Fee Code	Small Entity Fee ($)	Fee Description
103	18	203	9	Claims in excess of 20
102	78	202	39	Independent claims in excess of 3
104	260	204	130	Multiple Dependent claim, if not paid
109	78	209	39	**Reissue independent claims over original patent
110	18	210	9	**Reissue claims in excess of 20 and over original patent

SUBTOTAL (2) ($) 246.00

FEE CALCULATION (continued)

3. ADDITIONAL FEE

Large Entity Fee Code	Large Entity Fee ($)	Small Entity Fee Code	Small Entity Fee ($)	Fee Description	Fee Paid
105	130	205	65	Surcharge - late filing fee or oath	
127	50	227	25	Surcharge - late provisional filing fee or cover sheet.	
139	130	139	130	Non-English specification	
147	2,520	147	2,520	For filing a request for reexamination	
112	920*	112	920*	*Requesting publication of SIR prior to Examiner action	
113	1,840*	113	1,840*	*Requesting publication of SIR after Examiner action	
115	110	215	55	Extension for response within first month	
116	380	216	190	Extension for response within second month	
117	870	217	435	Extension for response within third month	
118	1,210	218	680	Extension for response within fourth month	
128	1,850	228	925	Extension for response within fifth month	
119	300	219	150	Notice of Appeal	
120	300	220	150	Filing a brief in support of an appeal	
121	260	221	130	Request for oral hearing	
138	1,510	138	1510	Petition to institute a public use proceeding	
140	110	240	55	Petition to revive - unavoidable	
141	1,210	241	605	Petition to revive - unintentional	
142	1,210	242	605	Utility issue fee (or reissue)	
143	430	243	215	Design issue fee	
144	580	244	290	Plant issue fee	
122	130	122	130	Petitions to the Commissioner	
123	50	123	50	Petitions related to provisional applications	
126	240	126	240	Submission of Information Disclosure Stmt	
581	40	581	40	Recording each patent assignment per property (times number of properties)	
146	790	246	395	Filing a submission after final rejection (37 CFR 1.129(a))	
149	790	249	395	For each additional invention to be examined (37 CFR 1.129(b))	

Other fee (specify) _____
Other fee (specify) _____

*Reduced by Basic Filing Fee Paid

SUBTOTAL (3) ($)

SUBMITTED BY

				Complete (if applicable)	
Typed or Printed Name	Gregory D. Caldwell			Reg. Number	39,926
Signature		Date	09/15/00	Deposit Account User ID	02-2666

Burden Hour Statement: This form is estimated to take 0 2 hours to complete Time will vary depending upon the needs of the individual case Any comments on the amount of time you are required to complete this form should be sent to the Chief Information Officer, Patent and Trademark Office, Washington, DC 20231. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS SEND TO: Assistant Commissioner for Patents, Box Patent Application, Washington, DC 20231.

Trans express mail no. EL034434638US

042390.P9139

APPLICATION FOR UNITED STATES LETTERS PATENT

FOR

DISPLAY SCREEN

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DISPLAY SCREEN

RELATED APPLICATIONS

This patent application is a continuation-in-part of US Patent Application Serial No. 09/318,501, filed on May 25, 1999, titled, "Display Screen," Raj at el., (attorney docket 042390. P7131) and of US Patent Application Serial No. 09/318,683, filed on May 25, 1999, titled, "Anti-Reflection Layer in Spatial Light Modulators," by Booth et al., (attorney docket 042390. P7128), these applications being concurrently filed, and assigned to the assignee of the present invention.

This patent application is also related to concurrently filed US Patent Application Serial No. _____, titled, "Tiled Display Screen," by Booth et al., (attorney docket 042390. P9140), assigned to the assignee of the present invention, and herein incorporated by reference.

BACKGROUND

The present disclosure is related to displays, such as display screens.

Display contrast is a factor in the visual quality of a display system. Techniques for improving the contrast of such systems continue to be desirable.

BRIEF DESCRIPTION OF THE DRAWINGS

The subject matter regarded as the invention is particularly pointed out and distinctly claimed in the concluding portion of the specification. The invention, however, both as to organization and method of operation, together with objects, features, and advantages thereof, may best be understood by reference to the following detailed description when read with the accompanying drawings in which:

FIG. 1 is a schematic diagram illustrating an embodiment of a display screen;

FIG. 2 is a schematic diagram illustrating an embodiment of a display screen in accordance with the present invention;

FIG. 3 is a schematic diagram illustrating another embodiment of a display screen in accordance with the present invention; and

FIG. 4 is a schematic diagram illustrating yet another embodiment of a display screen in accordance with the present invention.

DETAILED DESCRIPTION

In the following detailed description, numerous specific details are set forth in order to provide a thorough understanding of the invention. However, it will be understood by those skilled in the art that the present invention may be practiced without these specific details. In

other instances, well-known methods, procedures, components and circuits have not been described in detail so as not to obscure the present invention.

As previously discussed, display contrast is a factor in the visual quality of a display system. While some displays or display screens have good contrast in conditions of no or nearly no ambient illumination, such displays or display screens have reduced contrast where ambient illumination is present. This is sometimes due, at least in part, to reflectance of this ambient illumination. Likewise, even in conditions of no or nearly no ambient illumination, display contrast might be improved if light scattering internal to the screen is reduced and, perhaps, even eliminated. Some embodiments in accordance with the invention, such as those described hereinafter, may provide such improved contrast.

FIG. 1 is a schematic diagram illustrating an embodiment 100 of a display screen. FIG. 1 illustrates a cross-sectional view from above. As illustrated in FIG. 1, this embodiment includes a back plane layer 110, a layer 120 that includes emissive pixels, such as 125, a layer 130 that includes holographic film patches, such as 135, and a substrate or cover plate 140. Typically, as will be appreciated by those of ordinary skill in the art, these layers may be comprised of the following materials. Emissive pixel materials, such as layer 120, may comprise inorganic or organic electro-luminescent materials, such as organic light emitting polymers. Holographic film patches may comprise photopolymer or dichroics; back plane layer 110 may comprise ceramic; and substrate of plate 140 may comprise any commonly used optical quality glass; however, other materials may also be employed.

As FIG. 1 illustrates, a holographic film, such as patches 135, 136, and 137, applied to the inside of cover plate 140 absorbs light from the ambient environment incident on the cover

plate, such as light ray 150. In this context, the term holographic film, patch, layer or the like, refers to a film, patch, or layer, for example, made of or including material or materials having the capability to affect or control the transmission or reflection of incident light of specific wavelengths, at least in part, through principles of diffraction. In addition, this film or these patches may absorb light emitted from emissive pixels, such as from 125 or 126, as, for example, where emitted light is back scattered or reflected backwards from the cover plate material or from the interface between the cover plate and the ambient environment, in this example, air. Light ray 160 illustrates this in FIG. 1. In this context, the term holographic film, patch, layer or the like, refers to a film, patch, or layer, for example, made of or including material or materials having the capability to affect or control the transmission or reflection of incident light of specific wavelengths, at least in part, through principles of diffraction. Additional information about this technology may be obtained, for example, from "Holographic Diffusers for LCD Backlights and Projection Screens," by J. M. Tedesco et al., appearing in Society of Information Display (SID) 93 Digest, paper 5.3, pp. 29-32 (1993); "A Novel High-Resolution Ambient-Light-Rejection Rear Projection Screen," by D. W. Vance, appearing in SID 94 Digest, paper 34.2, pp. 741-744 (1994); and "Rear Projection Screen for Light Valve Projection Systems," by J. F. Goldenberg et al., appearing in Proc. of Society of Photo-Optical Engineers (SPIE), Vol. 3013, pp. 49-58 (1997).

However, as previously indicated, additional improvements in contrast remain desirable. For example, in FIG. 1, some ambient light and internal light that is scattered may not be absorbed. This light may reduce display contrast and, therefore, degrade visual quality.

FIG. 2 is a schematic diagram of an embodiment 200 of a screen display in accordance with the invention. FIG. 2 is also a cross-sectional diagram shown from above. Of course,

FIG. 2 illustrates only one of many possible embodiments within the scope of the present invention. Therefore, the invention is not restricted to this particular embodiment, and this particular embodiment, 200, is provided merely as an illustration.

Embodiment 200 in FIG. 2 illustrates a display screen, such as may be employed in a flat panel display for a display system. Although the invention is not limited in scope in this respect, such systems may employ liquid crystal technology. This particular embodiment includes a back plane layer 210, a layer 220 including emissive pixels, such as 225, a layer 230 that includes holographic film patches, such as 235, and a cover plate layer 240. Here, the layers combine to form a display screen having a structure so that at least some light is emitted from the emissive pixel layer into the ambient environment. This is desirable so that an image on the display screen may be viewed. In addition, the holographic film layer includes patches of holographic film having a front and back side, where the front side of the holographic film patches faces the cover plate layer and adjacent structures are formed therein, such as 255 and 265 or 256 and 266, to trap at least some incident light, as described in more detail below.

As illustrated in FIG. 2, the layer that includes the holographic film 230 is patterned as a grid in this embodiment. This provides openings for emitted light to be transmitted to a viewer capable of perceiving an image on the display screen, for example. However, the holographic patches or plates comprise a material capable of absorbing at least a portion of light incident upon the material. Furthermore, as illustrated in FIG. 2 by light rays 250 and 260, the adjacent structures, such as 256 and 266, are formed to trap light incident upon the material that is not initially absorbed by the material. In this particular embodiment, structures, such as 255 and 265, have a moth-eye-like shape, although the invention is not limited in scope in this respect.

A variety of shapes may be employed that are capable of trapping light, as desired. For example, alternatively, a pyramid-like shape or a pillar-like shape may be employed. As illustrated, in this embodiment, the structures are shaped so that incident light not initially absorbed by the holographic film is reflected to again impinge upon the material. Furthermore, here the structures are shaped so that even if light is not absorbed after multiple reflections, it will continue to impinge upon the material. In this context, this is referred to as "trapping" the light, such as for light that is either not reflected out of the screen display or that is reflected within the screen display, but away from the holographic film or patch, in this particular embodiment.

The invention is not limited in scope to a particular holographic material, however, examples of such material include: Photopolymers, such as available from E.I. du Pont de Nemours and Company, Wilmington, Delaware (hereinafter, "DuPont"); and/or High Energy Beam Sensitive (HEBS) glass, such as available from Canyon Materials, Inc. The amount of absorption and reflection that occurs for incident light depends at least in part upon the particular material employed; however, material, such as photopolymers, for example, may be employed in some embodiments, for example, where approximately in the range of from 2 to 10 percent of the incident light is reflected. Therefore, due at least in part to the shape of the adjacent structures, unabsorbed light is reflected so that the next time it impinges upon the material it may be approximately 90 to 98 percent absorbed and approximately 2 to 10 percent reflected, for this embodiment, although, the invention is not limited in scope to these percentages and they may vary depending upon a variety of factors. However, again, this may be repeated multiple times so that a relatively small amount of bulk reflectance takes place.

Holographic films having the desired structure may be fabricated on planarized surfaces using a technique called interference lithography, although the invention is not limited in scope to employing only this technique. For example, Holographic Lithography Systems, based in Bedford, MA, employs such fabrication techniques. In this context, the term interference lithography refers to a holographic technique, typically maskless, in which patterning of material occurs via electromagnetic interference. Using such an approach, feature sizes as small as 90 nanometers, for example, may be patterned over a relatively wide area. Likewise, this technique may be employed to fabricate structures such as 255 and 265 or 256 and 266, shown in FIG. 2 and as previously described. In addition to producing structures having relatively low reflectance over relatively large wavelength bands and relatively large angular acceptance ranges, this approach allows for fabricating the structures for wavelength selectivity or "tuning." For example, this may be employed in some embodiments to provide color balancing, if desired. Again, although the invention is not limited in scope in this respect, one example of a commercially available holographic film suitable for such fabrication is available from DuPont.

In an alternative approach, HEBS gray level masks may enable mass production of three-dimensional (3D) microstructures that may also be employed. For example, it may be possible to fabricate a gray-level or gray-scale mask using a standard e-beam tool. HEBS-glass turns dark upon exposure to an electron beam. Furthermore, controlling the electron dosage may control the level of darkness. Therefore, HEBS-glass may be capable of resolution to molecular dimensions. There are a number of potential advantages, such as reduction in alignment errors, reduction in the use of chemicals, and an economical mask fabrication technique. Canyon Materials, Inc., San Diego, CA, for example, makes custom HEBS-glass gray level masks . These gray-level masks enable mass fabrication of 3-D

microstructures and may employed in several fields of micro technology, including fabrication of embodiments of holographic films and/or patches in accordance with the present invention. Again, the forgoing are just two examples of techniques that may be employed to fabricate the desired structures and the invention is not in scope to a particular technique.

FIG. 3 is a schematic diagram illustrating another embodiment in accordance with the invention, again, illustrated in cross-section from above. Here, embodiment 300 comprises a screen display that includes a back plane 310, emissive pixels, such as 325, holographic film patches, such as 335 and 345, and a cover plate, 340, combined in layers to form a display screen having a structure so that at least some emitted light is transmitted into the ambient environment and so that at least some light propagating within a layer that includes emissive pixels is absorbed, although, again, the invention is not limited to this particular embodiment.

This embodiment is similar to the previous embodiment in that both light reflected within the display screen and ambient light transmitted into the display screen is absorbed by a holographic film. This is illustrated, for example, by light rays 350 and 360. Whereas in the previous embodiment light is absorbed by adjacent structures, here, the holographic patches are positioned in different layers so that light that is scattered or reflected to within the layer that includes the emissive pixels may be absorbed. This is illustrated in FIG. 3 by light ray 360 and patch 326 and by light ray 350 and patch 327.

FIG. 4 is a schematic diagram illustrating yet another embodiment in accordance with the invention, again, illustrated in cross-section from above. Here, embodiment 400 comprises a screen display that includes a back plane 410, emissive pixels, such as 425, holographic film patches, such as 435 and 445, and a cover plate, 440, combined in layers to form a display

screen having a structure so that at least some emitted light is transmitted into the ambient environment and so that at least some light propagating within a layer that includes emissive pixels is absorbed, although, again, the invention is not limited to this particular embodiment.

This embodiment is similar to the previous embodiment; however, whereas in the previous embodiment light is absorbed by holographic patches positioned in different layers so that light that is scattered or reflected to within the layer that includes the emissive pixels may be absorbed by a holographic film, in FIG. 4, some holographic film or films are being employed to reflect a major portion of the incident light. This is illustrated in FIG. 4 by light ray 460 and patch 445, for example. Therefore, the invention is not limited in scope to employing holographic materials primarily to absorb incident light. In some embodiments, depending on the circumstances, holographic materials may also be employed in some instances, at least, primarily to reflect incident light.

An embodiment of a method of trapping at least a portion of light incident upon the front side of a holographic film, such as may be performed by embodiment 200 illustrated in FIG. 2, for example, includes the following. At least a portion of the light, in some embodiments, as previously described, a major portion of the light incident on the front side of holographic film, such as 230, illustrated in FIG. 2, for example, may be absorbed. Likewise, the remaining incident light that is not absorbed, at least initially, may be reflected in a manner so as to be incident upon the front side of the holographic film again. For the light that is again incident upon the front side of the holographic film, at least a portion, in some embodiments, as previously described, a major portion, of this again incident light may be absorbed into the front side of the holographic film, whereas the remaining, not absorbed, again incident light may be reflected in a manner so as to be incident upon the front side of the holographic film

yet again. This may be repeated multiple times. At least some of the light initially incident upon the front side of the holographic film may comprise light reflected backwards, such as reflected or scattered from inside face 201 of cover plate 240 in FIG. 2, for example.

In another embodiment, a method of trapping at least a portion of light scattered by an inside face, such as 201, of a cover plate, such as 240, of a display, such as 200, may include the following. At least some of the scattered light incident on the front side of a holographic film, such as patch 235, may be absorbed, in some embodiments, a major portion. The remaining scattered light incident on the front side of the holographic film may be reflected in a manner so as to be again incident upon the front side of the holographic film after reflection. Furthermore, again, as described for the previous embodiment, this may be repeated multiple times. For example, in one embodiment, as illustrated in FIG. 2, light may be reflected between two adjacent structures, such as 255 and 265 or 256 and 266, in the front side of the holographic film or patch

It will, of course, be understood that, although particular embodiments have just been described, the invention is not limited in scope to a particular embodiment or implementation. Likewise, although the invention is not limited in scope in this respect, one embodiment may comprise an article, such as a display screen. Such a display screen may be employed, for example, as part of a system, such as a host computer, a computing system, a platform, or an imaging system.

While certain features of the invention have been illustrated and described herein, many modifications, substitutions, changes and equivalents will now occur to those skilled in

the art. It is, therefore, to be understood that the appended claims are intended to cover all such modifications and changes as fall within the true spirit of the invention.

CLAIMS:

1. A display comprising:

a back plane layer; an emissive pixel layer; a holographic film layer; and a cover plate layer;

said layers being combined to form a display screen having a structure so that at least some light is emitted from the emissive pixel layer into the ambient environment;

said holographic film layer including patches of holographic film having a front and back side, the front side of the holographic film patches facing the cover plate layer and adjacent structures formed thereon to trap at least some incident light therebetween.

2. The display of claim 1, wherein the adjacent structures comprise moth-eye-like shaped adjacent structures.

3. The display of claim 1, wherein the adjacent structures comprise pyramid-like shaped adjacent structures.

4. The display of claim 1, wherein the adjacent structures comprise pillar-like shaped adjacent structures.

5. The display of claim 1, wherein the display comprises a flat panel display.

6. The display of claim 1, wherein said layers are combined to form a display screen having a structure so that at least some light is emitted from the emissive pixel layer into the ambient environment via openings in the holographic layer and through the cover plate layer.

7. A method of trapping at least a portion of light scattered by an inside face of a cover plate of a display comprising:

absorbing at least some of the scattered light incident on the front side of the holographic film; and

reflecting the remaining scattered light incident on the front side of the holographic film in a manner so as to be again incident upon the front side of the holographic film after reflection.

8. The method of claim 7, and further comprising:

for the light again incident upon the front side of the holographic film after reflection,

absorbing at least a portion of the light again incident upon the front side of the holographic film; and

reflecting the remaining light again incident in a manner so as to be yet again incident upon the front side of the holographic film after reflection.

9. The method of claim 7, wherein absorbing at least some of the incident scattered light comprises absorbing a major portion of the incident scattered light.

10. The method of claim 9, wherein a major portion comprises a percentage of the incident light approximately in the range of 90 to 98 percent.

11. A film layer for a display comprising:

a holographic film;

said holographic film having a front and back side;

the front side of the holographic film having adjacent structures formed therein to trap at least some incident light therebetween.

12. The film layer of claim 11, wherein the holographic film is positioned in a display so that at least some light reflected backwards by the inside face of a cover plate is incident upon its front side.

13. The film layer of claim 12, wherein the display includes at least a back plane and a cover plate.

14. The film layer of claim 11, wherein the adjacent structures comprise at least one of the following: moth-eye-like shaped structures, pyramid-like shaped structures, and pillar-like shaped structures.

15. A method of trapping at least a portion of light incident upon the front side of a holographic film comprising:

absorbing at least a portion of the incident light on the front side of the holographic film; and

reflecting the remaining incident light in a manner so as to be again incident upon the front side of the holographic film after reflection.

16. The method of claim 15, and further comprising:

for the light again incident upon the front side of the holographic film after reflection,

absorbing at least some portion of the light again incident upon the front side of the holographic film; and

reflecting the remaining light again incident upon the front side of the holographic film in a manner so as to be yet again incident upon the front side of the holographic film.

17. The method of claim 15, wherein at least some of the light incident upon the front side of the holographic film comprises light reflected backwards.

18. The method of claim 15, wherein absorbing at least some of the incident scattered light comprises absorbing a major portion of the incident scattered light.

19. The method of claim 18, wherein a major portion comprises a percentage of the incident light approximately in the range of 90 to 98 percent.

20. An article comprising:

a back plane, emissive pixels, holographic film patches, and a cover plate combined in layers to form a display screen having a structure so that at least some emitted light is transmitted into the ambient environment and so that at least some light propagating within a layer that includes emissive pixels is absorbed by one or more of said holographic film patches.

21. The article of claim 20, wherein absorbed light comprises at least one of emitted light reflected within the display screen and ambient light transmitted into the display screen.

22. The article of claim 21, wherein the absorbed light at least comprises emitted light reflected backwards within the display screen prior to absorption.

23. The article of claim 21, wherein said holographic film patches include adjacent structures formed therein to trap at least some incident light.

24. The article of claim 21, wherein absorbed light at least comprises both emitted light reflected within the display screen and ambient light transmitted into the display screen.

25. The article of claim 20, wherein display screen further having a structure so that at least some light propagating within said layer is reflected by one or more of said holographic film patches.

ABSTRACT

Several embodiments in accordance with the invention are disclosed. In one particular embodiment, a display screen for a display is discussed.

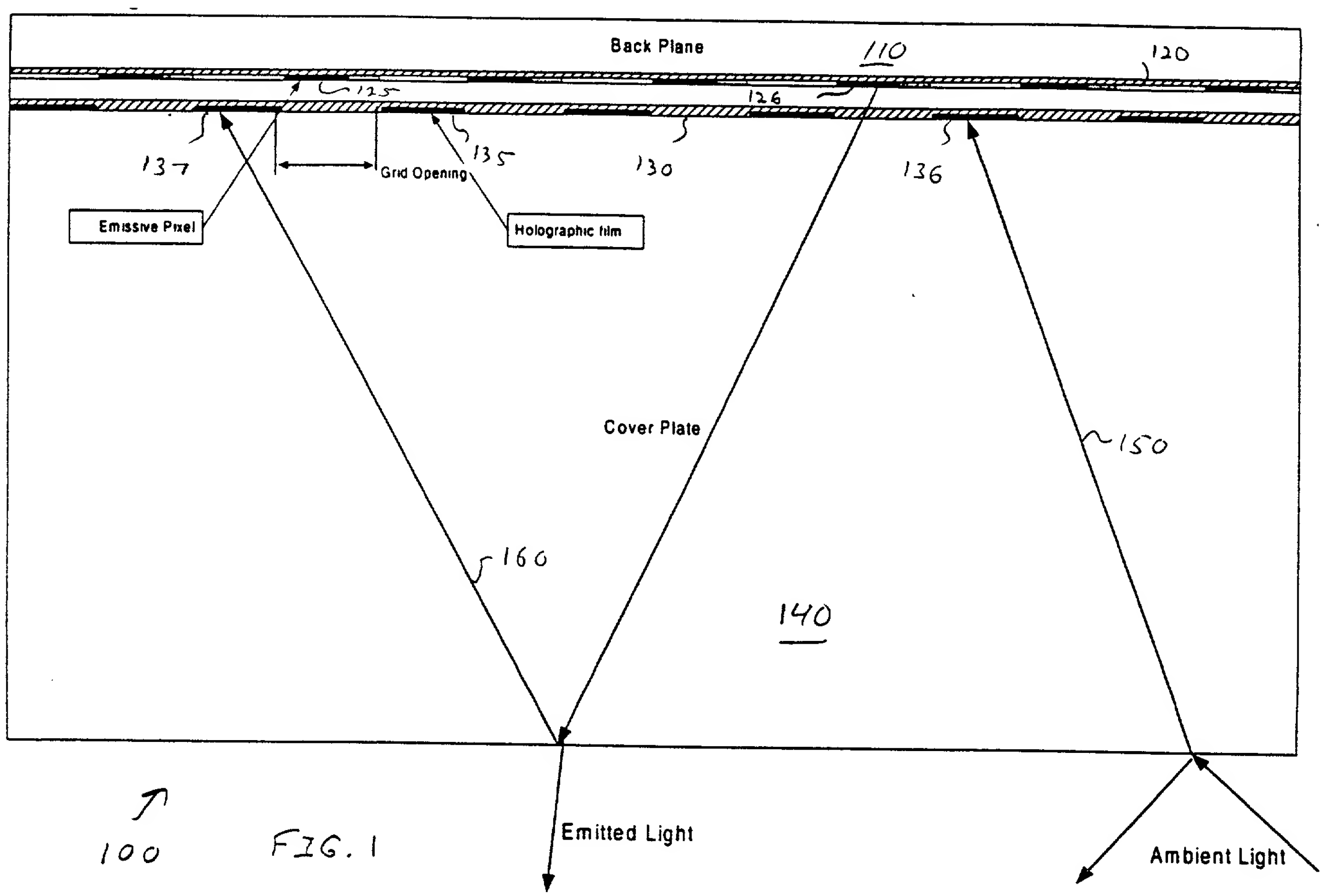


FIG. 1

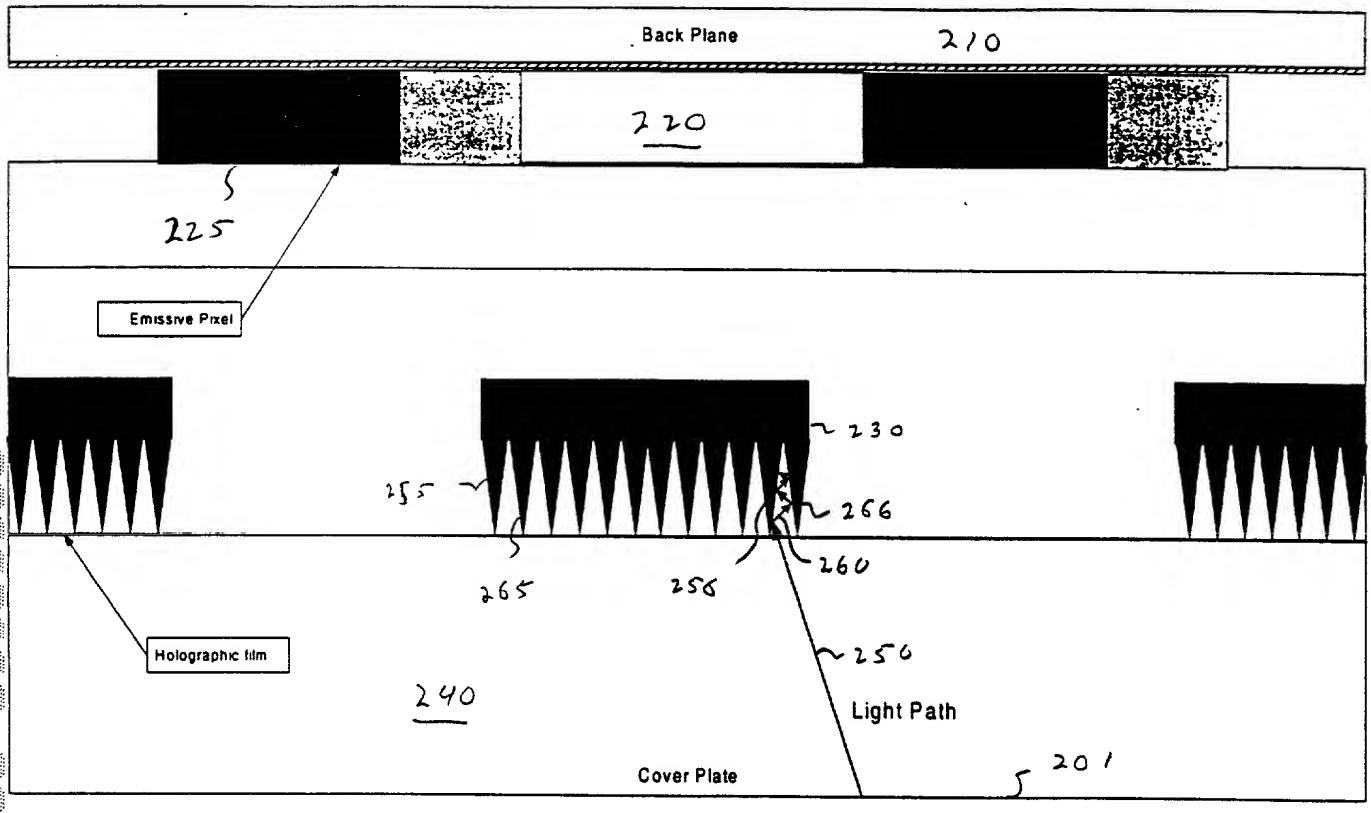

Back Plane
210
220
225
Emissive Pixel
230
255
266
260
265
258
250
Holographic film
240
Light Path
Cover Plate
201
200

FIG. 2

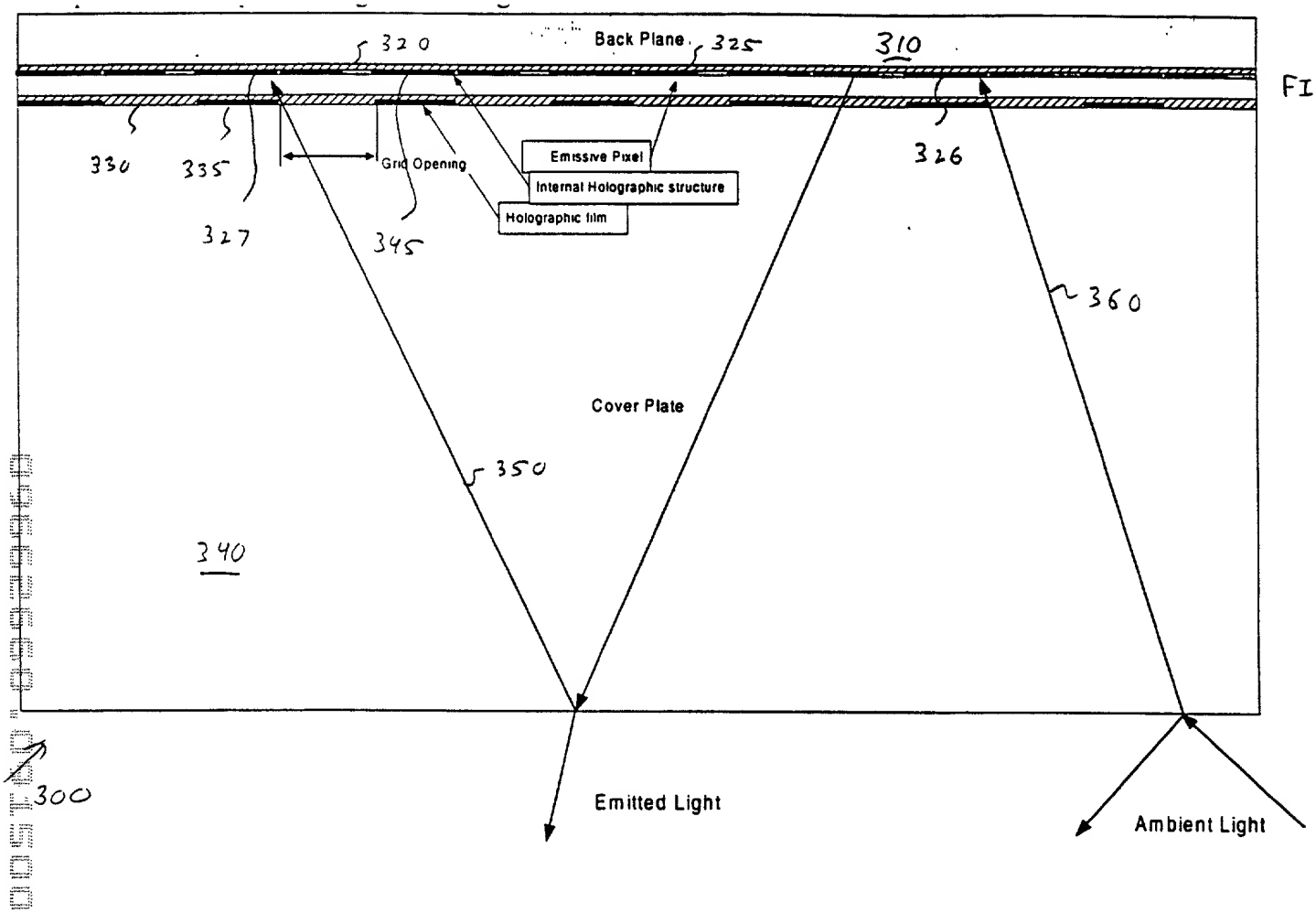
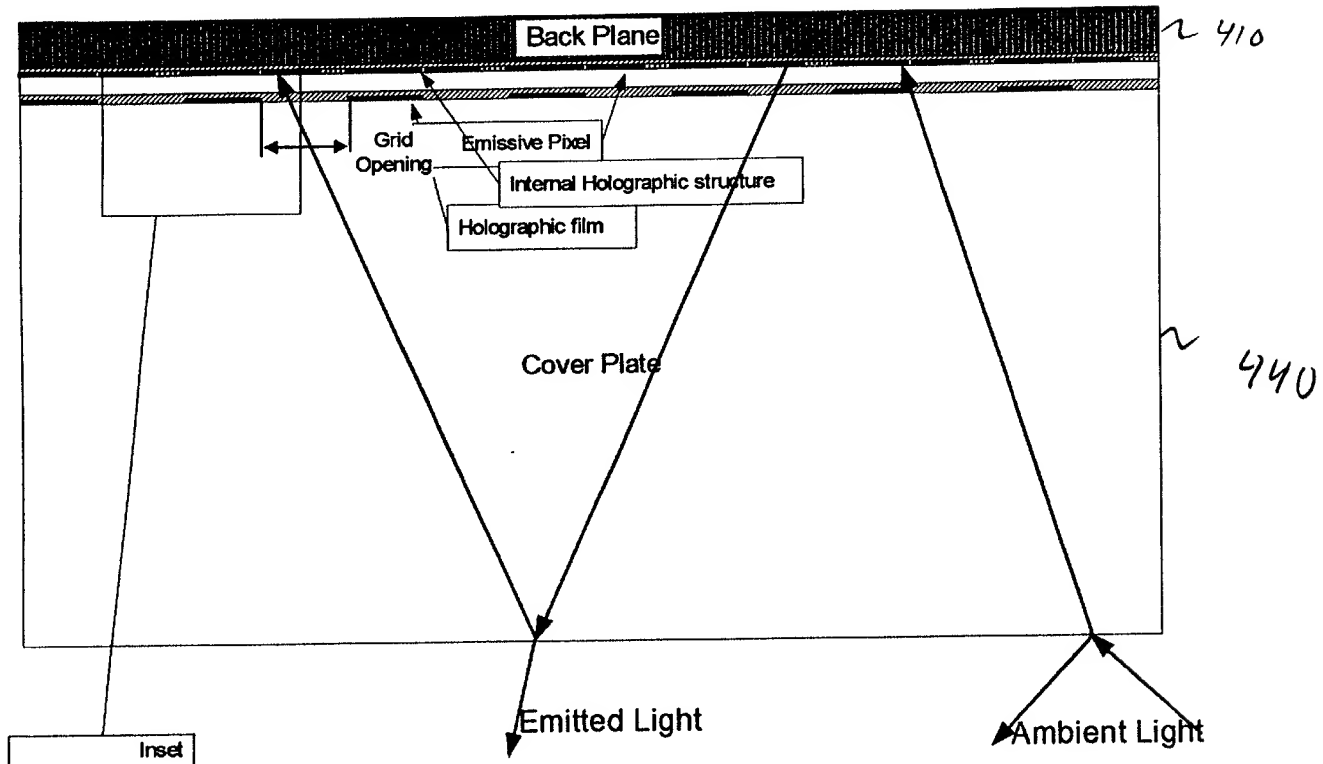

320
Back Plane
325
310
330
335
327
345
Grid Opening
Emissive Pixel
Internal Holographic structure
Holographic film
326
360
Cover Plate
350
340
300
Emitted Light
Ambient Light

FIG. 3



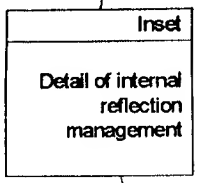
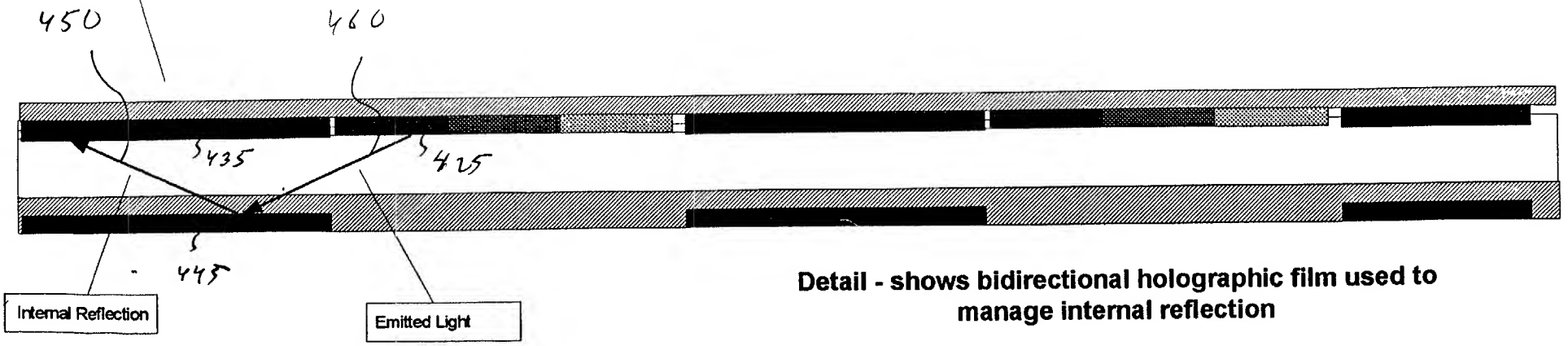


FIG. 4



Detail - shows bidirectional holographic film used to manage internal reflection

DECLARATION AND POWER OF ATTORNEY FOR PATENT APPLICATION (FOR INTEL CORPORATION PATENT APPLICATIONS)

As a below named inventor, I hereby declare that:

My residence, post office address and citizenship are as stated below, next to my name.

I believe I am the original, first, and sole inventor (if only one name is listed below) or an original, first, and joint inventor (if plural names are listed below) of the subject matter which is claimed and for which a patent is sought on the invention entitled

DISPLAY SCREEN

the specification of which

[X] is attached hereto.
[ ] was filed on _____ as
United States Application Number _____
or PCT International Application Number _____
and was amended on _____ .
(if applicable)

I hereby state that I have reviewed and understand the contents of the above-identified specification, including the claim(s), as amended by any amendment referred to above. I do not know and do not believe that the claimed invention was ever known or used in the United States of America before my invention thereof, or patented or described in any printed publication in any country before my invention thereof or more than one year prior to this application, that the same was not in public use or on sale in the United States of America more than one year prior to this application, and that the invention has not been patented or made the subject of an inventor's certificate issued before the date of this application in any country foreign to the United States of America on an application filed by me or my legal representatives or assigns more than twelve months (for a utility patent application) or six months (for a design patent application) prior to this application.

I acknowledge the duty to disclose all information known to me to be material to patentability as defined in Title 37, Code of Federal Regulations, Section 1.56.

I hereby claim foreign priority benefits under Title 35, United States Code, Section 119(a)-(d), of any foreign application(s) for patent or inventor's certificate listed below and have also identified below any foreign application for patent or inventor's certificate having a filing date before that of the application on which priority is claimed:

Prior Foreign Application(s):

APPLICATION NUMBER	COUNTRY (OR INDICATE IF PCT)	DATE OF FILING (day, **month**, year)	PRIORITY CLAIMED UNDER 37 USC 119
			☐ No ☐ Yes
			☐ No ☐ Yes
			☐ No ☐ Yes

I hereby claim the benefit under Title 35, United States Code, Section 119(e) of any United States provisional application(s) listed below:

APPLICATION NUMBER	FILING DATE

I hereby claim the benefit under Title 35, United States Code, Section 120 of any United States application(s) listed below and, insofar as the subject matter of each of the claims of this application is not disclosed in the prior United States application in the manner provided by the first paragraph of Title 35, United States Code, Section 112, I acknowledge the duty to disclose all information known to me to be material to patentability as defined in Title 37, Code of Federal Regulations, Section 1.56 which became available between the filing date of the prior application and the national or PCT international filing date of this application:

APPLICATION NUMBER	FILING DATE	STATUS (ISSUED, PENDING, ABANDONED)

I hereby appoint the persons listed on Appendix A hereto (which is incorporated by reference and a part of this document) as my respective patent attorneys and patent agents, with full power of substitution and revocation, to prosecute this application and to transact all business in the Patent and Trademark Office connected herewith.

Send correspondence to:
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(Name of Attorney or Agent)
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(Name of Attorney or Agent)

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

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Full Name of Fourth/Joint Inventor (given name, family name) _____

Inventor's Signature _____ Date _____

Residence _____ (City, State) Citizenship _____ (Country)

P. O. Address _____

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Full Name of Fifth/Joint Inventor (given name, family name) _____

Inventor's Signature _____ Date _____

Residence _____ (City, State) Citizenship _____ (Country)

P. O. Address _____

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Full Name of Sixth/Joint Inventor (given name, family name) _____

Inventor's Signature _____ Date _____

Residence _____ Citizenship _____
(City , State) *(Country)*

P. O. Address _____

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Full Name of Seventh/Joint Inventor (given name, family name) _____

Inventor's Signature _____ Date _____

Residence _____ Citizenship _____
(City , State) *(Country)*

P. O. Address _____

_____

Full Name of Eighth/Joint Inventor (given name, family name) _____

Inventor's Signature _____ Date _____

Residence _____ Citizenship _____
(City , State) *(Country)*

P. O. Address _____

_____

Full Name of Ninth/Joint Inventor (given name, family name) _____

Inventor's Signature _____ Date _____

Residence _____ Citizenship _____
(City , State) *(Country)*

P. O. Address _____

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APPENDIX A

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